by no means the only culprit—is that, even amongst scientific men, botany has come to be regarded in this country as scarcely a serious branch of science at all, and as little more than a kind of biological equivalent of the "Use of the Globes," suitable, indeed, for ladies' schools, and useful, also, like "Materia Medica," for the purpose of occupying the attention of medical students so as to keep them out of mischief during their first summer session.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*]

Visual Phenomena

In support of Mr. Arnulph Mallock's conclusion (vol. xiv. p. 350) as to the cause of the star-shaped appearance presented to the naked eye by a bright point, perhaps the following epitome of some notes which I made last January may have interest:—

1. Looking at a distant lamp, with both eyes, I see a radiant corona round the lamp.

2. I find that this corona is composed of two coronæ superposed, one due to the right eye, the other to the left.

3. Each corona has distinctive features of its own, which are recognised in every observation and have remained the same for years.

4. The radiant beams (which are the conspicuous feature) are not exactly radial, but are forked once or twice.

5. The corona is bounded by a peripheral fringe of blue succeeding to red.

6. The diameter of the corona varies with the diameter of the pupil. The distal portions of the radiant beams are concealed or revealed by the contraction or dilatation of the pupil.

7. Any given part of the radiance may be cut off by advancing an opaque body in front of the eye, from the *same* side as the given part of the radiance.

An obstacle which cuts off only the central rays of the entering pencil only dims the central image, but does not affect the radiance.

The radiance, therefore, is due to the outside rays of the entering pencil becoming excessively refracted so as to be thrown across the visual line before reaching the retina.

8. There is nothing in the *cornea, aqueous humour*, or pupillary margin of the *iris*, that can cause such refraction.

9. It appears most likely that this excessive refraction of the outside rays of the entering pencil is caused by something in the crystalline lens—probably, in the first place, by undue convexity of the more marginal parts of the lens, which are uncovered by dilatation of the pupil.

10. The *radiant* appearance of the corona is probably due to the radiate structure of the crystalline lens.

The agreement between them is pretty close, extending to the furcate character of the rays.

11. On examining my own eyes by a pencil of diverging rays (admitted so as to throw a shadow of anything inside the eye upon the retina) I find that the main beams of the radiance correspond pretty well to the main radii of my lenses, in the opposite direction.

This confirms that the radiance is due to the radiate structure of the lens.

In one particular my observations differ from Mr. Mallock's. He finds that the length of the rays depends "on the brightness of the point" as well as on the size of the pupil. I find that points of different degrees of brightness have rays of the same length, that length being limited only by the size of the pupil, but that the *breadth* of each ray varies with the apparent size of the lamp-flame or other luminous point under observation. Indeed, if the lamp-flame is so bright as to stimulate the iris to contraction, the rays become shortened in like measure.

The radiate structure of the lens of the human eye is well shown in Kölliker's "Manual of Human Microscopic Anatomy" (ed. 1860, p. 568). The "non-fibrillated" or "central planes" there described are possibly of greater refractive power than the wedge-shaped fibrillated portions between them. This would cause the phenomenon of radiance by excessive refraction of the outside rays of the entering pencil. Hubert Airy

Edensor, Kidbrook Grove, Blackheath, Aug. 28

Species and Varieties

It may be taken, I presume, that the description and naming of "species" has now a great value as material for studying the laws of the evolution of species and of geographichal distribution and variation; and that the question is not so much to know what name to call a "species" as to account for its presence and form in the economy of nature. And it will, perhaps, also be granted that the study of geographical distribution does not consist alone in acquiring a knowledge of the fauna of a district, so much as in investigating the laws of the special differentiation of that fauna. It thus becomes evident that the slightest modification tending to persistency requires the most careful record, as it is only by the knowledge of first slight modifications that we can expect to understand the process of larger divergencies.

In faunistic catalogues, should the author be inclined to the "lumping method" (perhaps in one sense correctly), a form may be considered as only a variety of some well-known species, and recorded under that name. We thus learn nothing of its modification, and are led to think of it as agreeing with the typical form, thus losing one of the most important facts in our study of variation and distribution. Another element of error seems also co-existent. When a newly-discovered form is designated a variety of another species, it would lead us to suppose that that species is the original type from which the other form has branched. But it is quite possible to suppose on such reasoning that the newly-discovered form may have been the parent from which the previously described species may have been derived. The offspring may have been collected and described before the parent; or we may be filling a space with planets to which there is no sun. This I have frequently suspected in the study of exotic lepidoptera, a study which is principally confined to the perfect form of the insects and of whose larval changes we know in most cases nothing. It rests generally on the judgment of individual entomologists as to the amount of difference to be considered specific.

Without venturing on the vexed question as to species and varieties, would it not be furthering the cause of science that what are considered as merely local varieties should, *as such*, have as careful a description as though they were ranked as species. W. L. Distant

Buccleuch Road, West Dulwich.

Antedated Books

I cannot allow that our *Transactions* are antedated, as is asserted by "Another F.Z.S." As is the case with the *Philosophical Transactions* of the Royal Society and the Linnean *Transactions*, no date beyond the year of issue is given on the cover, but there is the additional advantage of the date at which each number goes through the press at the bottom of the sheets. There can, however, I think, be no objection to giving a still more exact date of publication on the cover, and this, in accordance with "Another F.Z.S.'s" suggestion, for which I am much obliged to him, I propose to do in future.

P. L. Sclater

I am sorry to see that "F.Z.S." still prefers to write under the signature of his first letter. I was in hopes that when he saw the gravity of the accusation which he was bringing against me, he would in his own person have disclaimed any intention of seriously laying such a charge to my door, but as no word of apology escapes him, I regret that in making such an injurious statement he has not added the weight of his name to the accusation. I am, therefore, at liberty to suppose that he is no stranger himself to the "evil practice" (*honi soit qui mal y pense*) which he deprecates, otherwise I cannot imagine such a thought occurring to anyone; but it is evident that on receiving the book his only impulse was to write a letter to this journal instead of charitably endeavouring to discover some feasible explanation of what he calls the "false" date. As most naturalists in England are in the habit of following the rules of the British Association in regard to nomenclature, "F.Z.S." can find more profitable

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employment for his pen in proposing such alterations or additions to these rules as would remedy the "grievance" (as I term it) or the "evil practice" (as he prefers to call it), and in that I can assure him he would meet with hearty co-operation from all English naturalists, and from none more heartily than from the undersigned. R. BOWDLER SHARPE

The Origin of Variations

THERE is a slight difference between all three of the answers to Mr. Murphy's queries on Protective Mimicry (vol. xiv. pp. 309, 329); but, I think, the authors of those replies are unanimously over-hasty to call in the aid of protective selection. I cannot but think that the perpetuation of nascent variations may more safely be attributed to causes identical with those in which the variations originate. If this be so, though the origin of variation is necessarily beyond the scope of any selection-theory, these causes continuing to act on the varying organism become of vast importance to the evolutionist. Too much importance cannot, I think, be given in this connection, to the principle of economy of nutrition, or balancement of growth, formulated by Aristotle, in the words "*ἅμα δὲ τὴν αὐτὴν ὑπεροχὴν εἰς πολλοὺς τόπους ἀδυνατεῖ διανέμειν ἡ φύσις*," and by Goethe, in the expression "Nature, in order to spend on one side, is forced to economise on the other." I gave one example of this law in a previous letter (NATURE, vol. xiii. p. 107) in speaking of the indirect uses of the waste, or secondary products of metastasis in plants; but as the subject is admirably sketched in Mr. Lowne's suggestive essay on "The Philosophy of Evolution," a work too little known or appreciated, I will give here an outline of the argument. Food may be divided into three parts—for nutrition, for the production of energy and waste, or excretion. In many lower organisms the excreted material forms a simple shell; in plants manna, nectar, and resins belong to this group. The chief form of energy in the organic kingdom is that resulting from the oxidation of carbon, chiefly characteristic of animals, while plants secrete the energy-producing material. In higher organisms it is physiologically advantageous that the parts of an organism should differ in the kind of nourishment they require and thus act, as Sir James Paget has shown, as excretory organs to one another. Thus all animals which feed on large quantities of comparatively slightly nutritious matter have a complicated digestive apparatus, and a strong tendency to the production of large skeletons or cutaneous organs, which relieve the special excretory organs. The stag applies a large portion of the calcareous salts derived from the herbage to the production of horns in the male and the bones of the young in the female. The thoracic appendages of the lamellicorns and the beaks of the toucan and hornbill are given as further examples, and "the dermal appendages of reptiles and the feathers of birds, rich in pigment and nitrogen are probably entirely excrementitious to the other tissues." Mr. Lowne makes an interesting final application of this hypothesis to the loss of the hairy covering of the human skin, it being the albuminous tissue most easily dispensed with to nourish the highly developed nervous system. "Phosphorus was likewise required in large quantities and the osseous system became reduced in size." The composition of the nutrient fluid of the organism remaining constant, the excreted matter will be so also, and thus, for example, a rudimentary horn or a pigment may be produced by a change of food and preserved, while the food remains the same, by a physiological selection, as preventing the overtaxing of the kidneys, before sexual selection or protective selection come into play. I have an instance in point before me. Two plants of variegated kale under the influence of the late drought have produced axial structures from the midribs and veins of all their leaves, and I have no doubt that were their seedlings grown under similar nutritive conditions, a race of plants thus substituting fibro-vascular tissue for the usually abnormal development of parenchyma in the kale would be produced. G. S. BOULGER

Agricultural College, Cirencester, Aug. 25

THE BRITISH ASSOCIATION

THE forty-sixth Annual Session of the British Association was formally opened last night by the address of the president, Prof. Andrews, of Belfast. From the reports of the preparations we have already given, it will have been seen that unusual efforts have been made to render this Glasgow meeting a success, and so far as can be judged at present this end has been gained. This is the third time the Association has met in Glasgow. The first occasion was in 1840, when the Marquis of Breadalbane was president, and the last time in 1855, when a similar honour was conferred on the Duke of Argyll. This is the eighth time the Association has held its meeting in Scotland, Edinburgh having been the first northern town visited, so far back as 1834, four years after the foundation of the Association; the Scottish capital was again visited in 1850 and 1871; Aberdeen in 1859, when Prince Albert was president; and Dundee in 1867.

The arrangements for the evening lectures, about which there was at one time some difficulty, have been happily completed. The first lecture will be delivered on Friday in the Kibble Palace, by Prof. Tait; the second, for working-men, in the City Hall, on Saturday evening, probably by Commander Cameron, R.N.; and the third on Monday, Sept. 11, in the Kibble Palace, by Prof. Sir C. Wyville Thomson.

Among the foreign visitors who are expected at the Glasgow meeting, are:—Dr. Janssen, Prof. Negri, of Florence, Prof. Braune, Leipsic, Dr. Edward Grubi, Breslau, Prof. Cohn, Breslau, Prof. Stoletow, Baron von Wrangell, St. Petersburg, and Prof. Ceruti, Rome.

The specially prepared Guide-book to Glasgow is in three volumes, some of the former guides of this description being considered too bulky. The volumes will be full of interesting information regarding such subjects as the geology of the Valley of the Clyde, fossils found in the West of Scotland; the archæology, zoology, and botany of the district; the rise and progress of the iron manufacture in Scotland, chemical industries, the engineering and ship-building industries of the Clyde, and the textile industries of Glasgow and neighbourhood. Mr. Graham, the Hon. Secretary of the Association, has prepared an excellent sketch map of the country surrounding Glasgow, with its general geological features, which has been lithographed, and will be inserted in one of the volumes. Each member of the Association will be presented with a copy of the handbook.

INAUGURAL ADDRESS OF THOMAS ANDREWS, M.D., LL.D., F.R.S., HON. F.R.S.E., M.R.I.A., &c., PRESIDENT.

SIX and thirty years have passed over since the British Association for the Advancement of Science held its tenth meeting in this ancient city, and twenty-one years have elapsed since it last assembled here. The representatives of two great Scottish families presided on these occasions; and those who had the advantage of hearing the address of the Duke of Argyll in 1855 will recall the gratification they enjoyed while listening to the thoughtful sentiments which reflected a mind of rare cultivation and varied acquirements. On the present occasion I have undertaken, not without anxiety, the duty of filling an office at first accepted by one whom Scotland and the Association would alike have rejoiced to see in this Chair, not only as a tribute to his own scientific services, but also as recognising in him the worthy representative of that long line of able men who have upheld the pre-eminent position attained by the Scottish schools of medicine in the middle of the last century, when the mantle of Boerhaave fell upon Monro and Cullen.

The task of addressing this Association, always a difficult one, is not rendered easier when the meeting is held in a place which presents the rare combination of being at once an ancient seat of learning and a great centre of modern industry. Time will not permit me to refer to the distinguished men who in early days have left here their mark behind them; and I regret it the more, as there is a growing tendency to exaggerate the value of later discoveries, and to underrate the achievements of those who have lived before us. Confining our attention to a period reaching back to little more than a century, it appears that during that time three new sciences arose, at least as far as any science can be said to have a distinct origin, in this city of Glasgow—Experimental Chemistry, Political Economy, and Mechanical Engineering. It is now conceded that Black laid the foundation of modern chemistry; and no one has ever disputed the claims of Adam Smith and of Watt to have not only founded, but largely

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